



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
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San Francisco, CA 94105

Environmental Assessment for Water System Improvements
City of Nogales, Sonora, Mexico

List of Acronyms

Acronym	Meaning
ADEM	Arizona Department of Emergency Management
ADEQ	Arizona Department of Environmental Quality
ADES	Arizona Department of Economic Security
ADHS	Arizona Department of Health Services
ADWR	Arizona Department of Water Resources
AEIC	Arizona Earthquake Information Center
AGFD	Arizona Game and Fish Department
AMA	Active Management Area
BECC	Border Environment Cooperation Commission
BOD	Biological Oxygen Demand
CNA	Comision Nacional del Agua
CoAPAES	Comision de Agua Potable y Alcantarillado del Estado de Sonora
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U. S. Environmental Protection Agency
ESRI	Environmental Systems Research Institutes
FNSI	Finding of No Significant Impact
HAPS	Hazardous Air Pollutants
IBWC	International Boundary and Water Commission
I/I	Infiltration/Inflow
IOI	International Outfall Interceptor
MCL	Maximum Contaminant Level
MMI	Modified Mercalli Intensity
NAU	Northern Arizona University
NEPA	National Environmental Policy Act
NIWTP	Nogales International Wastewater Treatment Plant
NPS	National Park Service
TSS	Total Suspended Solid
UMI	Nogales United Musical Instruments Plant
USFS	U. S. Forest Service
USFWS	U. S. Fish and Wildlife Service
VOC	Volatile Organic Compounds
WOARF	Water Quality Assurance Revolving Fund

1.0 PURPOSE AND NEED FOR ACTION

1.1 General Information.

Proposed Action: To provide funding assistance for expansion of the potable water distribution and storage system in the city of Nogales, Sonora (see Appendix A, Figure 1).

Applicant: Government of the State of Sonora, Mexico Comisión de Agua Potable y Alcantarillado del Estado de Sonora (CoAPAES)

Environmental Assessment Process. The U.S. Environmental Protection Agency (EPA) is charged with disbursement of funds for water and wastewater infrastructure projects in the U.S. and Mexico along the U.S./Mexico border. EPA policy for border funds requires certification by the Border Environment Cooperation Commission (BECC). This project was certified by BECC on January 18, 1996, in accordance with the following eight categories of BECC criteria as identified in the *Guidelines for Project Submission and Criteria for Project Certification* (BECC 1995):

1. General Project Description
2. Environment and Human Health
3. Technical Feasibility
4. Economic and Financial Feasibility
5. Social Issues
6. Community Participation
7. Operation and Maintenance
8. Sustainable Development

As part of the BECC certification process, the project sponsor submitted “Proyecto Integral Para Uso de Agua Potable, Tratamiento y Recarga en Nogales, Sonora, Septiembre de 1995” (Comprehensive Project for Water Supply, Treatment and Recharge in Nogales, Sonora). It is important to note that this project was certified under the BECC criteria published in September 1995, and that BECC has since published revised environmental criteria as of November 1996. All projects after November 1996 must satisfy the revised BECC criteria.

EPA has determined that it will follow the National Environmental Policy Act (NEPA) and EPA regulations 40 Code of Federal Regulations (CFR) Part 6 when making decisions regarding the use of border funds. EPA recognizes Phase I of the “Manifiesto de Impacto Ambiental - Proyecto Integral Para Uso de Agua Potable, Tratamiento y Recarga en Nogales, Sonora, Septiembre de 1995” as satisfying the requirements for environmental impacts in Mexico; however, for environmental impacts in the U.S., EPA is preparing this environmental assessment (EA). This EA incorporates by reference the “Manifiesto de Impacto Ambiental - Proyecto Integral Para Uso de Agua Potable, Tratamiento y Recarga en Nogales, Sonora, Septiembre de 1995,” and

therefore, evaluates only impacts to the environment in the United States arising from construction and operation of the Nogales, Sonora, Mexico water supply system.

The attached Finding of No Significant Impact (FNSI) and this EA will be circulated for a 30-day public review period, during which time the public and interested agencies are encouraged to submit comments. The EPA will not take administrative action on the project during this period. Following the public comment period, EPA will consider all comments submitted on the FNSI and EA before taking administrative action.

Scope of Environmental Assessment. The proposed project is within the city of Nogales, Sonora, Mexico; no improvements are proposed in Nogales, AZ. The purpose of this EA is to determine and document the potential beneficial and adverse impacts to the town of Nogales, AZ, i.e., the transboundary impacts from the proposed project in Nogales, Sonora, Mexico. A study area consisting of the city limits of the town of Nogales, AZ, a 20-mile reach of the Santa Cruz River, beginning at the U.S./Mexico border and flowing to the north, and a nine-mile reach of the Nogales Wash, a tributary to the Santa Cruz River, beginning at the U.S./Mexico border flowing to the north was used in this EA (see Appendix A, Figure 2).

This EA was prepared following Council of Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508) and EPA regulations (40 CFR Part 6). This EA documents the environmental consequences in the U.S. of the proposed federal action.

1.2 Purpose and Need. On January 18, 1996, the applicant received certification from BECC for the first phase of the Nogales, Sonora water supply and distribution project. Phase I involves the upgrade and expansion of the potable water distribution and storage system and the Los Alisos Well Field. Upgrade of other well fields (Mascarenas, Santa Barbara, Paredes, Cibuta and Agua Caliente) may be considered in the future, as part of Phase II. This proposed project and EA are limited to portions of Phase I activities.

The existing water supply system varies widely in age and condition, and has various deficiencies such as undersized and deteriorating distribution lines, intermittent service, low water pressures, excessive leakage from distribution and storage facilities, and lack of micrometering (see Appendix A, Figure 3). Currently, there is a 4 MGD deficit during peak water consumption periods, only 85-percent of the city's population is provided with water service, and only 39-percent of the population has water service available 24 hours a day.

The Comision Nacional del Agua (CNA) has completed the construction of several Phase I components, specifically, the rehabilitation and expansion of the Los Alisos Well Field, the construction of a 30-inch transmission line, pump station and a principal storage tank (see Appendix A, Figure 4). A leak detection study and additional engineering analyses are also being completed to identify additional improvements that may be required.

The proposed project being addressed in this EA would increase the storage capacity of the system and reduce the need for pump stations. These improvements should partially improve the system's ability to meet peak demand and 24-hour water availability requirements. However, repair and expansion of the water distribution system will be necessary before the entire city has a reliable water supply.

The source of water for the existing water supply system of Nogales, Sonora originates in the aquifers beneath the urban area of the city and the Santa Cruz River and Los Alisos Basins. The Santa Cruz River Basin, located southeast of the city, encompasses the Mascarenas, Santa Barbara and Paredes Well Fields that withdraw groundwater at an estimated rate of 5.7 MGD. Water is conveyed northwesterly through a transmission line running parallel with the Santa Cruz River. Water is then intercepted by the Portezuelos Pump Station, from where it is pumped to the Coahuila Tank. This tank supplies water to a distribution network of pipes, tanks and pump stations that feed the city.

The Los Alisos Basin, located directly south of the city, encompasses the Urbana and Los Alisos Well Fields that withdraw ground water at a total estimated rate of 6.8 MGD. Water is conveyed northerly through a transmission line and is intercepted by the Nomenay and Saric Pump Stations along the way. The transmission line enters the city from the south and into the principal tank, which supplies water to the city's distribution network.

1.3 Recommendation. Pursuant to Section 511 of the Clean Water Act, the proposed project is considered to be a major federal action requiring compliance with the National Environmental Policy Act (NEPA). In accordance with the environmental review requirements of the Council on Environmental Quality found at 40 Code of Federal Regulations (CFR), Part 1500 and Title 40, Part 6, "*Procedures for Implementing the Requirements of the Council on Environmental Quality on the National Environmental Policy Act,*" the EPA has prepared this EA based on detailed review of the references listed in Section 7 of this EA.

On the basis of the assessment, the Regional Administrator has determined that this project in the state of Sonora, Mexico, will not result in any significant impacts on the environment, and that the preparation of an Environmental Impact Statement (EIS) is not warranted. The proposed project is considered to be cost-effective and environmentally sound, and the issuance of a Finding of No Significant Impact is recommended.

2.0 DESCRIPTION OF ALTERNATIVES

Several alternatives are available to both the EPA and CoAPAES, and have been considered in the planning of the proposed project.

2.1 Alternative 1—No Action. If the EPA chooses not to fund this project, much needed improvements may be delayed indefinitely because EPA funds are needed to complete the

project. The residents of Nogales, Sonora will continue to experience water shortages as the potable water system is inadequate to meet the needs of the existing population.

2.2 Alternative 2–Proposed Action. The EPA would approve grant funding for construction of the proposed project. The proposed project consists of some of the improvements to the water supply system remaining under Phase I (see Appendix A, Figure 4). The following is a more detailed description of those improvements:

2.2.1 Expansion. Expansion of the existing system involves the construction of the Anillos Perifericos (Perimeter Rings), which consists of two distribution mains and seven storage tanks that would convey potable water to the entire city of Nogales, Sonora via gravity (see Appendix A, Figure 5). Both distribution mains would begin at the Principal II Tank (existing), located in the southern portion of the city. The Principal II Tank, at an elevation of 1,400 m above mean sea level (M.S.L.) and having a capacity of 3,000 m³, would ultimately receive 19.3 MGD from the Los Alisos, Cibuta and Agua Caliente Well Fields. The east distribution main begins as a 24-inch diameter iron pipe traveling northeast to a 10-inch diameter branch discharging at the existing Principal I Tank. It then proceeds northeast to a 3-inch diameter branch discharging at the Villa Sonora Tank (existing). From there, the 24-inch main turns east and then northeast to the new San Carlos Tank (1,500 m³) at an elevation of 1,360 m. It discharges at the new Solidaridad Tank (1,500 m³), at an elevation of 1,330 m. The 24-inch main then takes on a northwest direction to the new Coahuila II Tank (3,000 m³), at an elevation of 1,350 m. The Coahuila II Tank would discharge freely into the Coahuila I Tank (existing) via 10-inch and 8-inch diameter branches. This tank would ultimately receive 13.6 MGD from the Mascarenas, Santa Barbara and Paredes Well Fields. Proceeding northwest from the Coahuila Tank, the 24-inch main splits in two with 12-inch and 18-inch diameter pipes. The 12-inch pipe runs west and discharges at the Penalosa Tank (existing), which feeds the Independencia Tank (existing). The 18-inch pipe runs north to the new Heroes II Tank (1,500 m³) at an elevation of 1,320 m. The remaining distribution main terminates with a 12-inch diameter pipe at the Juarez Tank (existing), in the northern portion of the city.

The west distribution main originates at the Principal II Tank as a 30-inch diameter pipe. The first discharge point is at the new Microondas Tank (3,000 m³), from where the flows diverge into the Nuevo Nogales Tank (existing) and the new Bellotas II Tank (1,500 m³) at an elevation of 1,360 m. At the Microondas Tank, the west distribution main becomes a 14-inch diameter pipe, and runs north until it discharges at the new Ocotillo Tank (1,500 m³), having an elevation of 1,360 m. At this point, the flows diverge to the existing Tamaulipas and Fovissste I Tanks. From the Ocotillo Tank, the main takes on a northeast alignment to a branch discharging at the Mariposas Tank (existing), which feeds the Canoas Tank (existing). The west distribution main continues northeast with a 4-inch diameter pipe and terminates at the Fovissste II Tank (existing).

2.2.2 Micrometering. The existing distribution system will be retrofitted with a metering system to account for water usage by the population being served.

These improvements will result in a more consistent water supply at a reduced operating cost (due to the closure of 33 pump stations). The seven new concrete tanks will increase storage by approximately 13,500 m³. This will allow the provision of potable water to the entire urban area of the city, including the areas of highest elevation, without the use of additional pump stations.

2.3 Alternative 3—Other Alternatives Considered by the Applicant. In 1992, the CNA prepared a master plan encompassing the proposed project. In November of 1996 a restudy of the master plan was performed in an effort to refine the proposed improvements. The master plan was modified, resulting in the reduction of initial investment and operational costs from expanding the city's water distribution system. Differences in projected water demands for the year 2016 yielded lesser flows that consequently reduced the pipe sizes originally proposed. Since 90-percent of the existing population resides at elevations below 1,300 m, it was determined that pumping all of the city's water to the Principal II Tank (1,400 m) was not efficient. Instead, water would be initially pumped to the Principal I Tank (existing) and discharged through the east main alignment described in Section 2.2.1. Construction of the west alignment would be postponed until the population growth warrants the additional flows. In the interim, distribution from the west will be via a 20-inch diameter main terminating at the Microondas Tank. A temporary pump station will assist in conveying water to the new tank.

The modification involved developing and evaluating several variations of the Perimeter Rings until the preferred alternative was selected. According to CoAPAES, no documentation exists that provides descriptions and evaluations of the other alternatives considered. The preferred alternative reduces the energy required of the water distribution system and permits phasing the construction of the system to reduce initial investment and operational costs. It is not anticipated that this will affect the impacts from expansion of the water distribution system, as the original scheme will ultimately be developed.

In developing the Perimeter Rings, CoAPAES also analyzed an alternate alignment that would result in a closed loop (versus a separate east and west branch). While this alternative would have resulted in similar environmental impacts as the proposed alternative, it was rejected since it would have required crossing more hilly terrain necessitating new pump stations. This alternative was rejected because of the added operational costs.

3.0 ENVIRONMENTAL SETTING

A study area consisting of the city limits of the town of Nogales, AZ, a 20-mile reach of the Santa Cruz River beginning at the US/Mexico border and flowing to the north, and a nine-mile reach of the Nogales Wash, a tributary to the Santa Cruz River, beginning at the US/Mexico border and flowing to the north was used in this EA (see Appendix A, Figure 2).

3.1 Land Resources. Land Use. The city of Nogales, AZ is located in the extreme southern portion of Santa Cruz County, on the US/Mexico border in southeastern Arizona.

According to the 1990 Census of Population and Housing provided by Arizona Department of Economic Security (ADES), the population of the city of Nogales, AZ and immediately surrounding area was about 19,190 persons (see Table 1). About 92-percent of the total population is of Hispanic origin. According to Arizona Department of Water Resources (ADWR), the growth rate for Nogales, AZ has been between five and eight-percent per year during the last 10 years. The ADES has projected that the population for the Nogales area will be more than 26,000 persons by the year 2015.

**Table 1, 1990 Census of Population and Housing
for the Incorporated Nogales Area**

Total Persons	19,198
White	13,438
Black	59
Native Americans	22
Other	5,655
Other Asians	14
Total Number of Families	4,457
Persons Earning an Income Less than \$10,000	965
Persons Earning an Income Between \$10,000-25,000	1,617
Mean Income	\$29,890
Per Capita Income	\$7,707

Source: ADES Arizona State Data Center, Population Statistics Unit.
(Census tracts BNA 9962 and 9963 for Nogales portion only, and BNA
9964.)

The US/Mexico border is one of the poorest regions in the state of Arizona. In the Nogales area, the average per capita income is about \$7,707; about 22-percent of the population earns less than \$10,000 a year, and 36-percent earn between \$10,000-25,000 (ADES).

Outside the city limits, a variety of industrial, rural, agricultural, open range lands (i.e., undeveloped land), and recreational land uses are found along the Nogales Wash and Santa Cruz River. The area between Nogales and Rio Rico consists of industrial parks and the Nogales International Wastewater Treatment Plant (NIWTP). In addition to traditional recreational land uses, ecotourism has become a popular activity in this area. The Santa Cruz River basin includes

some of the most valued and important ecosystems in southern Arizona. The riparian area north of the NIWTP attracts thousands of bird watchers annually bringing important tourist revenues to the local economy.

The Coronado National Forest, which covers almost 1.8 million acres of southeastern Arizona and southwestern New Mexico, is along the western portion of the study area.

Cultural Resources. According to the National Park Service, the city of Nogales has more than 35 sites listed on the National Register of Historical Places. These sites consist of: cottages, homes, hotels, residential districts, and government buildings such as the court house, customs house, and post office (see Table 2).

Table 2, National Register Sites and Locations for Nogales Area

10 Cottages–117-126 Short Street	Marsh, George B., Building–231-225 Grand Ave.
Arizona-Sonora Mfg. Co. Machine Shop–Grand Ave. at Arroyo Blvd.	Mediterranean Style House–124 Walnut St.
Bowman Hotel–314-316 Grand Ave.	Mediterranean Style House–116 Walnut St.
Bowman, W.G., House–112 Sierra	Miller, Hugo, House–750 Potrero
Burton Building–332-324 Grand Ave.	Montezuma Hotel–217 Morley Ave
Cruz, Frank F., House–408 Arroyo Blvd.	Nogales Electric Light, Ice & Water Company Power House–498 Grand Ave.
Crawford Hill Historic Residential District–bound by Oak St., Terrace Ave., Compoud St., I-19, and Grindell	Nogales High School–209 Plum
Dunbar, George, House–118 Sierra	Nogales Steam Laundry Building–223-229 East
Harrison, Sen. James A., House–449 Morley	Noon, A.S., Building–246 Grand Ave.
Hotel Blanca–701 Morley	Old Nogales City Hall and Fire Station–223 Grand Ave.
House at 220 Walnut Street	Piscorski, Jose, Building–315 Morley Ave.
House at 334-338 Walnut Street	Three Mediterranean Cottages–102-104 Pajarito Street
House at 665 Morley Avenue	U.S. Custom House–International and Terrace Sts.

Kress, S.H., & Co., Building–119-121 Morley Ave.	Wise, J.E., Building–134 Grand Ave
Las Dos Naciones Cigar Factory–331 Morley Ave.	U.S. Post Office and Immigration Station - Nogales Main–Hudgin St. and Morley Ave.
Marsh Heights Historic District–bound by Court St., Summit Ave., S. Court St., and Morley Ave.	Santa Cruz County Courthouse–Court St. and Morley Ave.

Geology and Soils. The physiography of the study area is characterized by mountains and basins formed by large scale normal faulting during the Basin and Range disturbance about 14 to 6-million years ago. The basin is underlaid by the sediments of the Tertiary-age Nogales Formation and Mesozoic-age intrusive volcanics, unconformably overlaid with a veneer of Quaternary-age sediments in the valleys. The Nogales Formation consists of mechanically deposited volcanic conglomerate with layers of sandstone and grit. The area is extremely dry desert lowland separated by linear-trending mountain ranges, with Nogales located in a narrow valley with an elevation of approximately 1,200 meters (IBWC).

According to the Arizona Earthquake Information Center (AEIC) at Northern Arizona University (NAU), the highest historic Modified Mercalli Intensity (MMI) levels occur in the southeastern portion of the state. The Sonoran earthquake of 1887, with an estimated magnitude of 7.2, occurred on the Mexican side of the border, but with the epicenter close to the international border, strongly affecting southeast Arizona. The total ground rupture length has been determined to be 75 km (Brausch).

The study area is prone to erosion due to steep slopes, occasional intense rain storm events, and wind (ESRI).

The soils in the study area are primarily shallow and rocky with unweathered clasts of andesite and rhyolite tuffs, granites, and small areas of clay shales. The steeper slopes have numerous rock outcroppings and shallow loamy soils. Five soil associations dominate the area: Comoro-Pima, Continental-Sonoita, Caralampi-White House - Hathaway, Lampshire-Chiracahua-Graham, and Faraway-Rock Outcrop-Barkerville. The first three are typically deep soils and sandy loams with varying amounts of gravel and clay, generally appearing in or along floodplains and streambeds. The latter two are typically shallow cobbled clay or sandy loams occurring in the upper elevations on foothills and mountains (IBWC).

Land Use Changes. It is anticipated that more people will continue to migrate to this area resulting in the continued conversion of open range and agricultural lands to residential and commercial uses in accordance with the current development patterns and trends.

3.2 Water Resources. Surface Waters. The Santa Cruz River flows south into Mexico, then turns and flows north into Arizona near Nogales. The Santa Cruz River is usually dry from the international border to approximately four miles north of the border, immediately upstream of the NIWTP. The average annual flow of surface water from Mexico into the U.S. portion of the basin is 55 Mm³ per year. Within the study area, there are two perennial segments: along the Santa Cruz River (22 km from Nogales to Tubac) and along Nogales Wash (6 km). The reach of the river north of Rio Rico is fed by treated effluent from the NIWTP, with an average monthly flow of 11.5 MGD during the period 1994-1997.

There are two tributaries to the Santa Cruz River in the study area: the Nogales Wash and Potrero Creek. The Nogales Wash is a perennial stream originating in Mexico, seven miles from the international border. The Potrero Creek feeds the wash at the northern limit of the Nogales area, flowing through Nogales for about 5 miles. Potrero Creek originates in Mexico, west of Nogales, and flows northeast to the Santa Cruz River, immediately south of the NIWTP. Both the Nogales Wash and Potrero Creek consist of meandering channels incised 5 to 25 feet deep in the flood plain of an alluvium-filled valley.

Wetlands. Riparian wetlands are found along the Santa Cruz River throughout the study area.

Flood Plains. In 1933, the U.S. and Mexican governments agreed to construct a joint flood control project to protect Ambos Nogales (Nogales, AZ and Nogales, Sonora) through the International Boundary and Water Commission (IBWC). The project consisted of a concrete-lined flood control channel along the Nogales Wash, 2.06 mile (3 km) in the U.S. and 0.71 mile (1 km) in Mexico (IBWC). According to ADWR, the flood plain of the Santa Cruz River varies in width from about 0.3 mile at the border of Mexico to 2.5-miles near the northern boundary of the Santa Cruz Active Management Area (AMA). All tributaries are considered potential flood hazard areas in this AMA for a 100-year flood. Some segments of the Santa Cruz River are considered potential flood hazard areas for a 500-year flood (ESRI).

Groundwater. The basin-fill sediments along the Santa Cruz River form three aquifers (listed in ascending order): the Nogales Formation, the Older Alluvium, and the Younger Alluvium. These three aquifers are shared between the two countries. Both alluvial units are generally unconfined, hydraulically connected, and yield water to wells. The Younger Alluvium ranging in depth from 40 to 150 feet is present along the river and some of its tributaries. According to the ADWR, this aquifer is the most productive and widely used in the region providing about 75-percent of the total water in the Santa Cruz AMA, with some wells yielding more than 1,000 gallons per minute (gpm).

Although the Older Alluvium aquifer (ranging from a few feet to about 1,000 feet) is the most extensive geologic unit within the Santa Cruz AMA, its transmissivity is generally low and well yields are often small. The Nogales Formation (at least 5,000 feet thick) is not generally considered an aquifer, since groundwater occurs primarily in fracture zones and unconsolidated layers within the formation (average yields are less than 30 gpm). Generally, the thickness and

width of the Younger Alluvium increases in a northerly direction following the path of the Santa Cruz River (ADWR).

The highly seasonal nature of surface water flow, the high transmissivity of the Younger Alluvium, and the discharge of effluent from the NIWTP complicate the analysis of water level change. According to the ADWR, the water level elevations (elevation of the water table above mean sea level) range from 3,000 to 4,000 feet in the Santa Cruz AMA.

The Santa Cruz River serves as a major source of recharge for the Younger Alluvium by seasonal methods: mountain front recharge, irrigation seepage, effluent discharge, and natural surface water flow. Four-micro basins, which lie upstream of the NIWTP, support the Santa Cruz River basin: Buena Vista, Kino Springs, Highway 82, and Guevavi (ADWR).

Local water table levels fluctuate with variations in weather patterns, water withdrawals within the Santa Cruz River basin (in Mexico and the U.S.), and incidental recharge from agricultural irrigation and NIWTP discharge. The shallow depth of the basin's aquifers and the high transmissivity of the alluvium make many portions responsive to precipitation events and susceptible to droughts.

The Nogales Wash, located within, and extending north of the city of Nogales, originates in Sonora, Mexico. The latest depth-to-water measurement in Arizona was about 30 feet in 1995. The surface water is considered of poor quality due mostly to discharge from leaking sewer lines in Ambos Nogales. Potrero Creek is northwest of the city of Nogales and one of two main water supply sources. A dual aquifer system exists in this area—the shallow aquifer (Younger Alluvium) supplies the creek, and the deeper aquifer (Older Alluvium) supplies the well field (ADWR).

Arizona Department of Environmental Quality (ADEQ) is working with the Mexican government to monitor groundwater quality and quantity in a few joint studies, such as:

- Binational Santa Cruz River Watershed Project (with ADWR)
- Nogales Wash Joint U.S./Mexico Groundwater Monitoring Project (with IBWC)
- Wellhead Protection Program for Nogales, Arizona (with ADWR)
- Northeastern Sonora Water Quality Monitoring Project (with Arizona Department of Health Services—ADHS)

Contaminants. The EPA regulates about 40 facilities in Nogales – one of these is listed as a State Superfund or Water Quality Assurance Revolving Fund (WQARF) Site (EPA, ADWR). WQARF is assigned to facilities with groundwater and/or soil contamination for monitoring and cleanup. The Nogales area WQARF site is the Nogales Wash.

Concentrations of volatile organic compounds (VOCs) above Maximum Contaminant Levels (MCL) have been detected. In particular, VOCs such as TCE and PCE (“perc” or

tetrachloroethylene), have been discovered at several isolated locations along the Nogales Wash (about 4-5 ppb per ADEQ). In addition, the ADEQ has discovered, through the joint groundwater monitoring program, PCE on the Mexican side of the border ranging from 400-500 ppb.

Water Quality Problems/Violations. Water quality problems in Nogales, AZ have been caused by broken wastewater lines in Sonora, crossing the border in the Nogales Wash, and leakages in the wastewater conveyance system on the U.S. side of the border. Contaminated runoff is pretreated by IBWC, as needed, in the Nogales Wash.

Wastewater Facilities/Projects. The NIWTP is on the west bank of the Santa Cruz River, north of the city of Nogales (14 km [8.8 miles] north of the international border). This treatment plant treats wastewater from Ambos Nogales, with costs shared by the city of Nogales, Arizona, the government of Mexico, and the U.S. Government. Initially constructed closer to the international border in 1951, the plant was relocated to its existing location. In September 1998, operation and maintenance of the NIWTP was transferred to the IBWC from the city of Nogales, AZ.

The existing plant was expanded in 1991 to a capacity of 17.2 MGD, of which 9.9 MGD is assigned to Mexico. The plant consists of two aeration lagoons and three stabilization ponds, followed by chlorination of the effluent which then is discharged in the Santa Cruz River, which flows north and supports the riparian corridor. Currently domestic wastewater flows from Nogales, Sonora across the international border via the International Outfall Interceptor (IOI) along the Nogales Wash. The annual average monthly flow for the period 1994 to 1997 was approximately 11.5 MGD. On an annual average basis, an estimated 2 MGD of infiltration/inflow (I/I) enters the system.

Currently, a binational wastewater facility planning effort is underway, funded by EPA, and coordinated by IBWC. This effort has identified six proposed projects that together address concerns with current and future wastewater treatments, which are: upgrading and expanding the NIWTP, replacing the IOI, rehabilitating the collection systems in Nogales, AZ and Nogales, Sonora, and constructing a treatment plant and conveyance system in Nogales, Sonora. Of the three projects in Arizona, the first project consists of plant upgrades by converting the existing aerated lagoon system to a conventional activated sludge system with sludge recirculation. The upgrade is designed to remove the nitrogen components of the wastewater, lower biological oxygen demand (BOD), and lower total suspended solid (TSS) levels. The capacity will be increased to 22.2 MGD. The second project consists of replacing the IOI to substantially reduce I/I (by at least 40-percent) that currently hampers treatment processes at the NIWTP. The influent will be less diluted, and the debris and sediments will be reduced. The third project consists of repairing and replacing deteriorated pipes in the system, providing better containment and transport of untreated wastewater.

Water Facilities/Projects. The sources of potable water for the city of Nogales, AZ are the Santa Cruz River (near the Highway 82 Bridge crossing) and the Potrero Creek. About 87-percent of the population of the city of Nogales receive their potable water from the city's water system. The Santa Cruz River is a shared aquifer with Nogales, Sonora. In addition, Nogales, AZ has 4,200 acre-feet of surface water rights at Patagonia Lake, although this volume is presently reserved solely for emergency use. A potable water delivery and treatment system does not exist. Surface water rights for Peña Blanca Lake (located 17-miles northwest of Nogales) are primarily owned by the U.S. Forest Service (USFS) and Arizona Game and Fish Department (AGFD). Private wells supply the remaining 13-percent of the population (ADEQ).

The sources of potable water for Nogales, Sonora are the Los Alisos Well Field, the Nogales Wash, and the Santa Cruz River Basin (Mascarenas, Santa Barbara and Paredes well fields).

3.3 Climate and Air Quality. Climate. The climate of the region is arid to semiarid, and characterized by warm summers and moderate winters. The climate varies largely due to elevation changes in the area with cooler temperatures and higher rainfall at higher elevations. The precipitation for the area varies considerably from month-to-month, and especially year-to-year. About 50 to 60-percent of the basin's rainfall occurs during the monsoon season (July through September); the remainder falling during the winter months as a result of large cyclonic storms. The driest months are April, May, and June. Average annual precipitation in the Santa Cruz River basin ranges from 280 to 400 mm in the Santa Cruz AMA, to about 710 mm in the mountainous areas. Mean high temperatures range from 67 F in January to 103 F in July (Liverman).

Air Quality. Areas with air quality that do not meet the standards are designated by the EPA as "non-attainment areas." The Nogales Planning Area is designated as a non-attainment area for particulate matter (PM). The emission sources have been identified as unpaved roads, cleared areas, and paved roads. According to the ADEQ, the Nogales PM-10 Non-attainment Area Attainment Plan estimates that 94-percent of the PM-10 emissions in the international region were generated in Nogales, Sonora. PM causes irritation and damage to the respiratory system, resulting in difficult breathing, inducement of bronchitis, and aggravation of existing respiratory diseases. Individuals with respiratory and cardiovascular diseases, children, and elderly persons are at greatest risk. The ADEQ is participating in the following air quality studies in Ambos Nogales:

- ADEQ, ADHS, and the Sonora Public Health Department have worked together to implement the Asthma/Air Quality Study of 5th Grade Children in Ambos Nogales. The study involved collection of respiratory disease data and correlation with pertinent air quality measurements taken in the vicinity of the elementary schools used for the project.
- ADEQ conducted the Ambos Nogales Binational Air Monitoring Project to address monitoring of emissions and atmospheric transport of PM-10 and hazardous air pollutants (HAPS).

Blowing dust and dirt may originate from disturbed ground during the construction of the proposed project. Construction activities near the border may have minor transboundary air impacts that can be mitigated by dust control measures such as wetting the soil.

3.4 Biotic Resources. Habitats. The habitats found within the study area are aquatic, riparian, and terrestrial. The Santa Cruz River basin includes some of the most valued and important ecosystems in southern Arizona. Historically, the Santa Cruz River supported seven species of native fish, but only two are currently present—the Gila topminnow and the longfin dace (King).

The Nogales Wash and the Santa Cruz River downstream of the NIWTP provide a variety of aquatic habitats. The vegetation along the Nogales Wash upstream of the NIWTP consists primarily of Fremont cottonwood, Gooding willow, and a variety of shrubs, providing shade and refuge areas. The longfin dace, mosquitofish, bullfrogs, crayfish, freshwater clams, snails, midge larvae, and a variety of aquatic invertebrates are commonly observed within these waters. Other portions of the Santa Cruz River, the remaining washes, and drainage areas that conduct water flow during and immediately following rain events, are considered ephemeral surface waters. Relatively few species depend on these waters for survival, growth, or reproduction. Most of the truly ephemeral aquatic residents are by definition adapted to long dry periods followed by wet periods of relatively short duration, such as the longfin dace, which probably finds refuge in the wetlands or other areas that may retain water during dry periods (IBWC).

The Santa Cruz River Drainage Basin sustains one of the richest, most diverse riparian habitats in southwestern U.S. These ecosystems are generally considered to be more productive than the adjacent uplands because of the periodic inflow of nutrients, especially when flooding is seasonal rather than continuous. Riparian areas are critical to biological community diversity and provide linear corridors important to migratory species. The Santa Cruz River riparian corridor is identified as Sonoran riparian deciduous forests and wetlands. Fremont cottonwood, Gooding willow, and velvet mesquite are the dominant tree species in the study area, supporting a large variety of animal species, including several endangered and threatened species. The brown vine snake, gray hawk, rose-throated becard, and the thick-billed kingbird are considered rare or threatened north of the Mexican border. The AGFD has determined that protection of riparian habitats is a departmental priority, and the state Governor's Executive Order 91-6 recognizes the importance of protecting and restoring riparian habitats in Arizona.

The study area comprises three primary terrestrial biotic communities or biomes—Madrean evergreen woodland, semidesert grassland, and Sonoran savanna grassland/Sonoran desertscrub. Although these biomes fall within the study area, they are found at higher locations than would normally be affected by water system projects of this type, and therefore are not discussed.

Threatened or Endangered Species. According to the U.S. Fish and Wildlife Service (USFWS), there are 17 listed and three candidate species for Santa Cruz County (Appendix B); the status of the Jaguar (*Panthera onca*) has yet to be determined. The list of threatened, endangered, and candidate species is shown in Table 3.

Table 3, Federally-Listed Species in Santa Cruz County

COMMON NAME	SCIENTIFIC NAME	STATUS
American peregrine falcon	<i>Falco peregrinus anatum</i>	E
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Cactus ferruginous pygmy owl	<i>Glaucidium brasilianum cactorum</i>	E
Canelo Hills ladies' tresses	<i>Spiranthes delitescens</i>	E
Chiricahua leopard frog	<i>Rana chiricahuensis</i>	C
Desert pupfish	<i>Cyprinodon macularius</i>	E
Gila chub	<i>Gila intermedia</i>	C
Gila topminnow	<i>Poeciliopsis occidentalis</i>	E
Huachuca spring snail	<i>Pyrgulopsis thompsoni</i>	C
Huachuca water umbel	<i>Lilaeopsis schaffneriana recurva</i>	E
Jaguarundi	<i>Felis yagouaroundi cacomitli</i>	E
Lesser long-nosed bat	<i>Leptonycteris curasoae yerbabuena</i>	E
Mexican gray wolf	<i>Canis lupus baileyi</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Northern aplomado falcon	<i>Falco feloralis septentrionalis</i>	E
Ocelot	<i>Felis pardalis</i>	E
Pima pineapple cactus	<i>Coryphantha scheeri robustispina</i>	E
Sonora chub	<i>Gila ditaenia</i>	T
Sonora tiger salamander	<i>Ambystoma tigrinum stebbinsi</i>	E
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E

E=Federally-listed endangered species; T=Federally-listed threatened species; C=Federal candidate species

4.0 IMPACTS OF THE PROPOSED ACTION.

The proposed project will be constructed in Nogales, Sonora, Mexico. The purpose of this EA is to assess the transboundary impacts, i.e., the impacts of the proposed project to the town of Nogales, AZ.

In Nogales, AZ, the proposed project would not result in direct or indirect impacts to water quality, wetlands, floodplains, land uses, air quality, noise, vegetation, wildlife and wildlife habitat, endangered and threatened species, national natural landmarks, cultural resources, archaeological resources, and public health and safety. Both beneficial and adverse impacts to surface water and groundwater quantity may result from the proposed project. However, these potential impacts are not considered significant.

Surface and Groundwater Resources. The proposed project may result in beneficial impacts to the Santa Cruz River, the Nogales Wash, and their adjacent groundwater resources. These potential impacts may be linked to the quantity of water being transferred from Los Alisos (a Mexican basin) to the binational Santa Cruz River basin.

The potential beneficial impacts to water quantity are:

- Increases in the water available in Sonora could lead to an increase in wastewater and, after treatment, to more effluent available for discharge into the Santa Cruz River in Arizona.
- The use of the proposed storage tanks on top of the hills surrounding Nogales, Sonora, can potentially result in greater/more consistent pressurization of the city's distribution system and therefore increase leakage rates until the pipes are replaced. It is not likely that the increased leakage would cause major variations in the current groundwater levels in Nogales, AZ.

Additionally, the potential impacts to the social environment of the study area and Environmental Justice were considered. In accordance with Executive Order 12898 on Environmental Justice (EJ), potential impacts to minority and low-income communities were evaluated. The EPA defines EJ as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. The goal of fair treatment is not to shift risks among populations, but to identify potential disproportionately high adverse impacts and to identify alternatives to mitigate those impacts. The proposed project, to be constructed solely on Mexican soil, will have no substantial impacts to the social environment of the study area in Nogales, AZ.

5.0 CUMULATIVE EFFECTS

To assess the potential cumulative effect of the proposed action, other past, present, and reasonably foreseeable future actions in the study area and region were considered. Other types of proposed actions considered were transportation projects, large-scale residential and commercial development, and governmental programs or regulations affecting an individual resource.

Wastewater system improvements are proposed for Nogales, AZ and Nogales, Sonora. New facilities in Mexico and expanded treatment facilities in the U.S. will provide sufficient capacity to treat additional effluent that will result from the additional water supply. The improvements include replacement of the IOI, the pipe that carries wastewater flows to the existing wastewater treatment plant in Nogales, AZ and presently, due to its deteriorated condition, likely allows mixing with groundwater in the Nogales Wash. Also expected to occur in the future is the construction of the remaining portions of Phase I of the water system improvements. This work should focus on the Nogales, Sonora water distribution system; locating and repairing undersized and deteriorated lines. No other past, present, or reasonably foreseeable future projects or actions contributing to cumulative environmental impacts have been identified.

As noted in the Section 4.0, potential impacts on Nogales, AZ from the proposed water system improvements assessed in this document relate to surface water and groundwater quantity. The above projects could affect groundwater and surface water quantity in the following ways:

- a) IOI replacement - the new pipe should substantially reduce infiltration (the amount of groundwater collected by the pipe), and exfiltration (wastewater lost to the groundwater),
- b) Nogales, Sonora water distribution system upgrade - rehabilitation of the water distribution and storage system consists of repairing and replacing existing distribution lines and storage tanks that contribute to leakage of the system. These improvements should reduce some of the estimated 50-percent water loss from the Nogales, Sonora water system [i.e., discharge from leaking pipes], potentially reducing groundwater levels and minimizing increasing pumpage from drinking water sources.

It is likely that the IOI improvements will cause a net increase in groundwater levels (and perhaps surface water levels) in the Nogales Wash. On the other hand, the water distribution system upgrade may lead to decreased groundwater levels in the Nogales Wash. It is unclear what the net effect of these actions may be. However, there should be no cumulative effects of the above projects and the proposed action. The proposed action may increase leakage rates (as described in the Section 4.0), but only until the distribution system upgrades described above are completed. Therefore, the proposed project would not result in a substantial cumulative effect to the project area defined in Nogales, AZ.

6.0 COMMENTS AND COORDINATION

6.1 Agency Coordination. At the beginning of the study, Early Coordination letters were sent to various federal, state, and local agencies in accordance with the procedural provisions of NEPA and USEPA's requirements for early coordination. Early coordination letters describing the proposed project were mailed to 21 agencies in July 1999, to notify them of the proposed project, request specific information, and encourage participation in the study by identifying initial concerns (see Table 4). Copies of the responses received to the Early Coordination letters are included in Appendix B.

Table 4, Summary of Early Coordination Letters

Agency	Request	Received
U.S. Geological Survey Tucson Field Office	general comments	8-24-99—identified three sample collection events for the Santa Cruz River and Nogales Wash; no results given
U.S. Fish and Wildlife Service Arizona Ecological Services Field Office	endangered species information and project comments	8-18-99—lists of endangered, threatened, proposed, and candidate species in the study area
U.S. Department of Labor Mine Safety and Health Administration Rocky Mountain District	general comments	8-4-99—replied with no comment or information
U.S. Army Corps of Engineers Albuquerque District	general comments	8-10-99—provided information regarding their Regulatory Permit Program
Natural Resources Conservation Service Douglas Service Center	soils information and project comments	no response
Arizona Department of Economic Security Division of Employee Services and Support, Research Administration	population data and economic characteristics and forecasts	8-5-99—provided population forecasts; 1990 census data for census tract parts within study area; census tract map

Arizona Department of Water Resources, Water Resources Planning Section	surface and groundwater information, flood plain maps	8-23-99–identified potential impacts to the Nogales Wash and to the Santa Cruz River
Arizona Game and Fish Department, Wildlife Management Division	wildlife and habitat information	9-9-99–provided lists of special status species in the study area
Arizona Game and Fish Department, Region V	wildlife and habitat information	no response
Arizona Department of Environmental Quality Southern Regional Office	general comments	no response
Arizona Department of Environmental Quality Air Quality Division	air quality information	no response
Arizona Department of Environmental Quality Waste Programs Division	project comments	no response
Arizona Department of Environmental Quality Water Quality Division	surface and ground water quality information	9-1-99–identified potential impacts to surface waters and groundwaters
Arizona Department of Health Services Office of Environmental Health	general comments	no response
Arizona Department of Mines and Mineral Resources	general comments	no response
Arizona State Parks State Historic Preservation Officer	archaeological and historical resources	8-23-99–identified several resources within Nogales, AZ. Requested clarification of the scope of the proposed project
Arizona Geological Survey	geologic information	8-3-99–forwarded a list of references to the geology of the Nogales, AZ area
Santa Cruz County Planning Department	general comments	no response
Santa Cruz County Board of Supervisors	general comments	no response

Santa Cruz County Department of Health	general comments	no response
Nogales City Building Department	general comments	no response

6.2 Public Involvement. CoAPAES conducted a public participation program in Nogales, Sonora, that included more than 20 public meetings with various neighborhoods. The residents learned about the scope of the project along with the financial plan. At the end of each meeting, the residents were given the opportunity to sign a petition accepting the proposed plan for water system improvements. In addition, meetings were held with local professional organizations, chambers of commerce and industry, and other groups such as the Kiwanis and Rotary Clubs.

7.0 REFERENCES

Note: substantial portions of this document are extracted and/or adapted from the Gannett Fleming document described below.

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**Appendix A:
Photos and Figures**



Photo 1: Typical view of the Nogales Wash in Nogales, AZ



Photo 2: Typical view of the Nogales Wash in Nogales, AZ



Photo 3: Typical view of the Nogales Wash



Photo 4: Typical view of the Santa Cruz River